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ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF TACTICAL NUCLEAR WARFARE

The BDM Corporation
7915 Jones Branch Drive
McLean, Virginia 22102

6 April 1979

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20. ABSTRACT (Continued)

were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Resulting issues were summarized and prioritized, key points identified, and shortcomings determined. Specific recommendations for continued research are presented.

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ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF TACTICAL NUCLEAR WARFARE

SUMMARY

OBJECTIVE

One uncertainty associated with the effectiveness of military operations in a nuclear environment is the nature of the psychological response of combat personnel and the impact of this response on individual performance. Present doctrine assumes no qualitative difference in response to conventional or nuclear warfare. Current concern regarding the validity of this assumption, the increasing sophistication of tactical equipment, and a realization of the significance of human factors in military operations has prompted a reexamination of this issue.

The objective of this program is to summarize the current status of research in this area, to identify the major issues, and to recommend directions for further study.

APPROACH AND METHOD

Studies concerning human response under stress and analyses of psychological response to conventional warfare were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Both the literature review and the interviews focused on issues concerning: problem relevance; status of research; key issues; response control; and ideas for further study. The resulting issues were summarized and prioritized, key points identified, and shortcomings in available knowledge determined. Based on a consideration of these findings, specific recommendations for continued research were developed.

MAJOR FINDINGS

Available studies and current research relevant to this issue are extremely limited, while community opinion is diverse. Two points of general consensus concern: first, the significance of this issue; and second, the need for training in establishing an effective "performance repertoire" within a nuclear environment. Lack of quantification represents the major difficulty in this research area. A specific recommendation for the inclusion of human performance variation in existing combat simulations is proposed as a first step in the development of a quantitative tool.

**ISSUES CONCERNING PSYCHOLOGICAL
RESPONSE TO
TACTICAL NUCLEAR WARFARE**

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**BRIEFING
OUTLINE**

- OBJECTIVES
- APPROCH
- KEY STUDY QUESTIONS
- THE LITERATURE
- THE COMMUNITY
- SUMMARY OF ISSUES
- RECOMMENDATIONS
- SUMMARY

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

OBJECTIVES

- TO IDENTIFY AND PRIORITIZE ISSUES CONCERNING
THE PSYCHOLOGICAL IMPACT OF NUCLEAR WARFARE
ON COMBAT PERSONNEL
- TO PROPOSE ALTERNATIVE METHODS FOR THE
INVESTIGATION OF THESE ISSUES

PSYCHOLOGICAL RESPONSE

TO TACTICAL NUCLEAR WARFARE

RESEARCH OVERVIEW

WHY CONSIDER THIS ISSUE?

- **RELEVANT DATA EXISTS, BUT IT IS INCONCLUSIVE**
- **SERIOUS INTEREST IS DEVELOPING BECAUSE OF:**
 - ***INCREASING EQUIPMENT COMPLEXITY***
 - ***A REALIZATION OF ITS POTENTIAL IMPACT***
- **THERE IS A NEED TO DETERMINE:**
 - ***CURRENT RESEARCH STATUS***
 - ***DIRECTIONS FOR FURTHER RESEARCH***
 - ***DNA POSTURE***

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

APPROACH

- INTERVIEW KEY PERSONNEL
- REVIEW THE LITERATURE
- IDENTIFY AND PRIORITIZE ISSUES
- PROPOSE ALTERNATIVE RESEARCH
METHODOLOGIES

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**STUDY
QUESTIONS**

- IS THIS A RELEVANT PROBLEM?
- WHAT WORK IS BEING DONE NOW AND WHO IS DOING IT?
- WHAT ARE THE DRIVING ISSUES?
- WHAT COULD BE DONE TO MINIMIZE ANY POTENTIAL PSYCHOLOGICAL IMPACT?
- HOW CAN FURTHER INVESTIGATIONS BE PERFORMED?

THE LITERATURE — AN OVERVIEW

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

- **WHAT WAS REVIEWED:**
 - **"THE VINEBERG STUDY"**
 - **INVESTIGATIONS OF THE IMPACT OF STRESS**
 - **REVIEWS OF PSYCHOLOGICAL CASUALTIES IN CONVENTIONAL WARFARE**
- **GENERAL OBSERVATIONS:**
 - **RESEARCH HAS BEEN EXTREMELY LIMITED**
 - **CURRENT DOCTRINE AND IDEAS REPRESENT AN EXTRAPOLATION FROM CONVENTIONAL WARFARE RESULTS AND "APPROXIMATING" LABORATORY INVESTIGATIONS**
 - **THE IMPACT OF PSYCHOLOGICAL RESPONSE "IN THE LARGE" HAS NOT BEEN CONSIDERED**

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**THE LITERATURE --
SPECIFIC OBSERVATIONS**

- IN GENERAL COMBAT ENVIRONMENTS:
 - LEADERS ARE UNDER MORE STRESS THAN FOLLOWERS
 - NEAR HITS ENHANCE ANXIETY
 - PSYCHIATRIC CASUALTIES ARE RELATED TO MOS, UNIT TYPE, AND NUMBER OF PHYSICAL CASUALTIES
- IN NUCLEAR COMBAT ENVIRONMENTS, ONE EXPECTS:
 - QUALITATIVE SIMILARITY TO CONVENTIONAL WARFARE
 - INCREASED ISOLATION
 - GREATER PRE-BURST APPREHENSION

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

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MR. C. SOMERS

BLM

SUMMARY OF KEY ISSUES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

FIRST ORDER THEMES

- THE PROBLEM IS QUITE RELEVANT
- THERE IS NO DIRECT ON-GOING RESEARCH
- DATA ARE INSUFFICIENT AND DIFFICULT TO COMPILE
- APPROPRIATE CBR RESPONSE DOES NOT EXIST IN THE CURRENT BEHAVIORAL REPERTOIRE OF COMBAT PERSONNEL

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**SUMMARY OF
KEY ISSUES**

SECOND ORDER THEMES

- A SIGNIFICANT PREMIUM WILL BE PLACED ON INDIVIDUAL SURVIVAL
- LEADERS WILL BE AFFECTED MORE THAN FOLLOWERS
- ALL PERSONNEL WILL SUFFER SOME FORM OF PSYCHOLOGICAL CASUALTY
- THE RESPONSE WILL BE AGENT-PROXIMITY SENSITIVE
- GAS IS MORE FRIGHTENING
- OTHER RELEVANT FACTORS INCLUDE:
 - UNIT COHESION
 - INTENSITY OF BATTLE
 - KNOWLEDGE OF SITUATION
 - ISOLATION
 - MISTRUST OF AUTHORITY
 - COMMUNICATION
 - POSITIVE LEADERSHIP
 - DANGER PAST

SUMMARY OF KEY ISSUES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

THIRD ORDER THEMES

- **SIGNIFICANCE OF EQUIPMENT BREAKDOWN
UNDER STRESS**
- **MEANING OF "PSYCHOLOGICAL CASUALTY"**
- **EXPECTED PERFORMANCE OF THE CURRENT ARMY
AND INCLUSION OF CULTURAL EFFECTS**
- **APPROPRIATENESS OF ORGANIZATIONAL
DEVELOPMENT**

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ISSUE DIFFERENCES

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

- **PERFORMANCE**
 - **NO DIFFERENCE FROM WW II**
 - **100% PSYCHOLOGICAL CASUALTIES**
 - **SIGNIFICANT UNCERTAINTIES IN CURRENT PERFORMANCE**
- **DATA**
 - **NATURAL DISASTER DATA ARE NON-ANALOGOUS**
 - **MANY-GROUP ISOLATION PHENOMENA ARE RELEVANT**
 - **DATA ADMIT ANY CONCLUSION**

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE RECOMMENDATIONS**

WHAT SHOULD BE DONE

- **TRAINING**
 - **GENERAL AS WELL AS SPECIFIC**
 - **PSYCHOLOGICAL FIRST-AID**
 - **DE-SENSITIZATION**
- **BETTER EQUIPMENT AND REPLACEMENT POLICIES**
- **INCREASED UNDERSTANDING OF STRESS ON THE
TACTICAL BATTLEFIELD**
- **PSYCHOLOGICAL RESEARCH IN CURRENT EXERCISES**

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

RECOMMENDATIONS

DIFFICULTIES

- **RELATIVE IMPORTANCE OF ISSUES**
- **QUANTIFICATION REQUIREMENTS**
- **EXTRAPOLATION ASSUMPTIONS**
- **DATA COLLECTION AND DATA BASE
DEVELOPMENT**

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE **RECOMMENDATIONS****

WHAT OUGHT TO BE DONE

- **QUANTIFY THE IMPACT OF A TACTICAL NUCLEAR
ENVIRONMENT ON THE PERFORMANCE OF
COMBAT PERSONNEL**
- **DETERMINE THE IMPACT OF THIS RESPONSE
ON SIMULATED BATTLE OUTCOME**
- **DEVELOP APPROPRIATE TRAINING/OPERATIONAL/
ORGANIZATIONAL RECOMMENDATIONS**

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SOME CONSIDERATIONS

- THERE ARE NO "REAL" ANSWERS
- THERE IS NO SYSTEMATIC WAY TO STUDY ACTUAL INDIVIDUAL PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE
- THE MOST USEFUL APPROACH IS TO PROVIDE PLANNERS AND COMMANDERS WITH A RANGE OF ALTERNATIVES

**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**A KEY OPERATIONAL
IDENTIFICATION**

**PSYCHOLOGICAL
RESPONSE**

=

**HUMAN
PERFORMANCE**

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

**RESEARCH
APPROACH**

**EXEMPLARY RESEARCH PROGRAMS
(OR, FIRST STEPS TOWARD QUANTIFICATION)**

- **SIMULATION**
 - **EMPLOY A DVA-SPONSORED COMBAT SIMULATION
TO INVESTIGATE THE SENSITIVITY OF KEY MOES TO A
RANGE OF VARIATION IN HUMAN PERFORMANCE**
- **ANALYSIS**
 - **EMPLOYING CURRENT TACTICAL HARDWARE SYSTEMS,
INVESTIGATE THE DYNAMICS OF THE MAN-MACHINE
INTERFACE IN STRESSFUL ENVIRONMENTS**

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

AN EXAMPLE

T-COR

- A THEATER LEVEL MODEL WITH TWO LEVELS OF DETAIL
 - DIVISION LEVEL (AGGREGATE CORPS)
 - COMPANY LEVEL (DETAILED CORPS)
- REALISTICALLY PORTRAYS COMBAT TO ANALYZE
 - BREAKTHROUGHS, PENETRATIONS, ENVELOPMENTS, ETC.
 - USE OF TACTICAL NUCLEAR WEAPONS
 - IMPACT OF C3
 - ALTERNATIVE ROLES AND MISSIONS FOR TACTICAL AIR RESOURCES

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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

WHY T-COR?

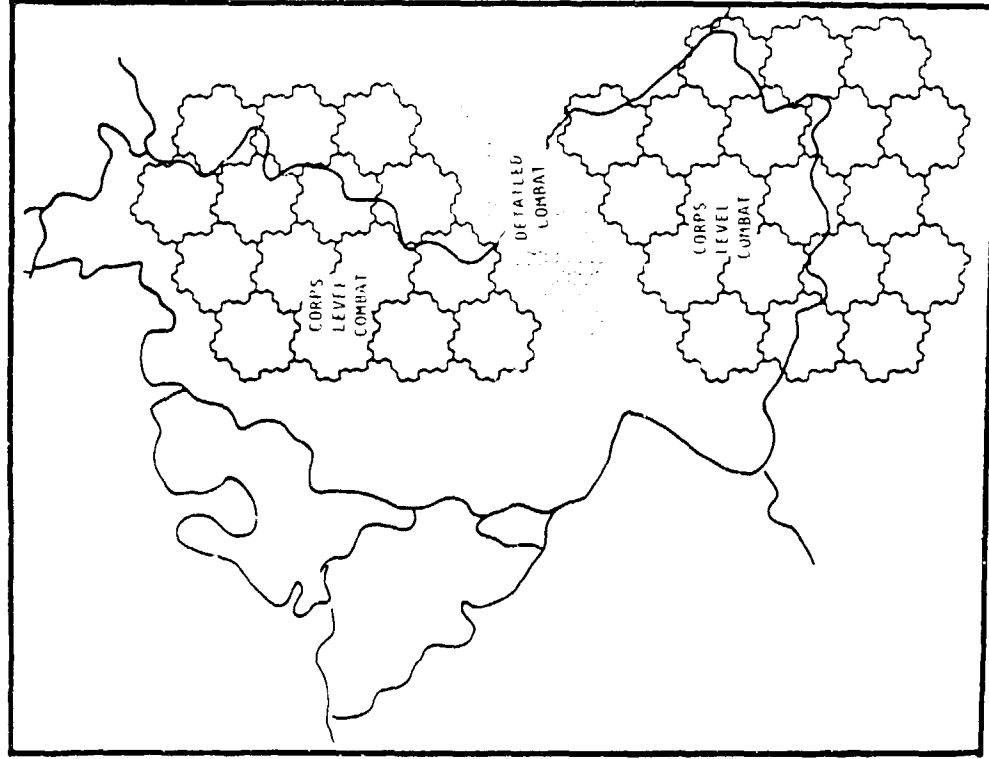
- AS A THEATER-LEVEL COMBAT SIMULATION, T-COR IS SENSITIVE TO VARIATIONS IN BATTLE EVOLUTION WITH VARIATIONS IN HUMAN PERFORMANCE
- T-COR IS A STATE-OF-THE-ART CAPABILITY
- T-COR IS A DNA-SPONSORED EFFORT
- T-COR CAN BE USED IN ITS PRESENT FORM

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

T-COR CHARACTERISTICS

MULTIPLE LEVELS OF DETAIL



- HIGH RESOLUTION COMPONENT
IN THEATER LEVEL CONTEXT
- DETAILED CORPS PROVIDES "FINE
STRUCTURE"; AGGREGATE CORPS
PROVIDE BOUNDARY CONDITIONS
- IMPLEMENTS "HIERARCHY OF MODELS"
CONCEPT WITHIN A CONSISTENT
MODELING FRAMEWORK
- ITERATIVE "TUNING" OF WHOLE MODEL
- POTENTIAL EXTENSION TO VARIABLE,
MODEL-SELECTED LEVELS OF DETAILS

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

PROCESSES MODELED IN T-COR

PROCESSES GROUND COMBAT

IMPLEMENTATION

- DIVISIONS (AGGREGATED CORPS)
COMPANIES (DETAILED CORPS)

COMBAT SUPPORT

- CLOSE AIR SUPPORT
ARTILLERY, MISSILES, MORTARS

MOVEMENT

- DIVISIONS (AGGREGATED CORPS)
MANEUVER COMPANIES
ARTILLERY BATTERIES
COMMAND POSTS

(DETAILED
CORPS)

PLANNING

- INTERPRETS INITIAL ORDERS
FORMULATES ORDER FOR SUB-
ORDINATES

THINKING

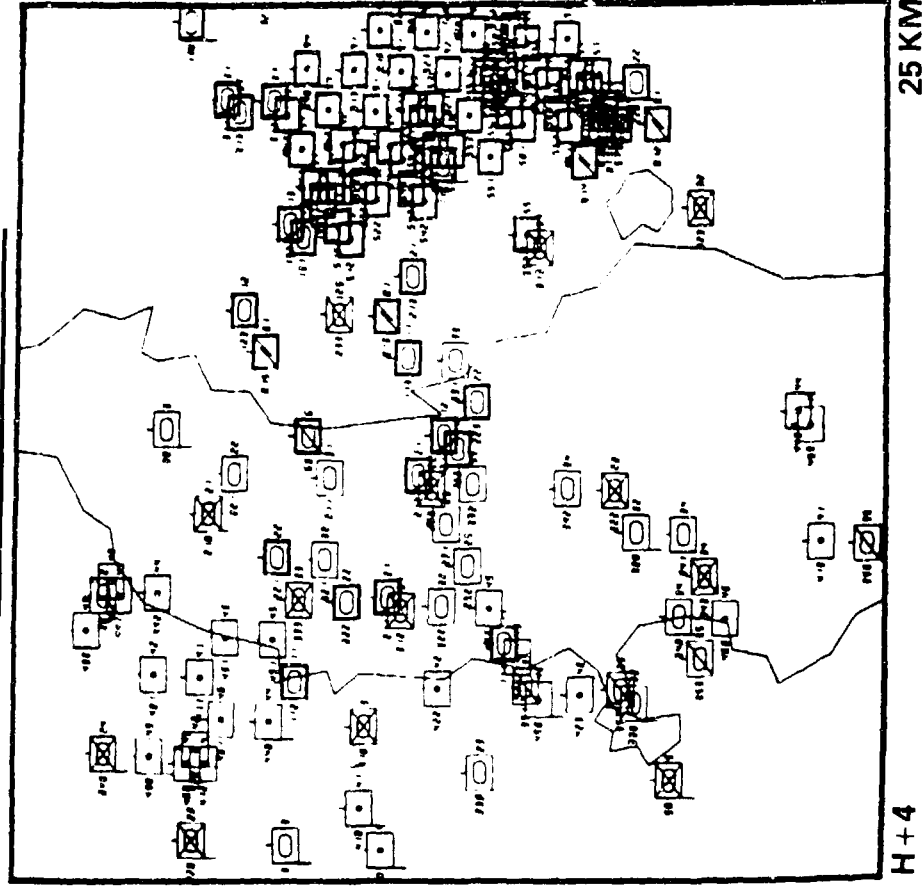
- OPERATIONS ORDERS
STATUS REPORTS
INTELLIGENCE REPORTS
ARTILLERY/CAS REQUESTS

**PSYCHOLOGICAL RESPONSES
TO TACTICAL NUCLEAR WARFARE**

**EXAMPLE T-COR
OUTPUT**

BREAKTHROUGH — PENETRATION OF BLUE POSITIONS
OUTPUT DISPLAY

- REALISTIC MOVEMENT
OF COMBAT FORCES
- RED PENETRATION
- BLUE PINCHING
OFF PENETRATION



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MODELING HUMAN BEHAVIOR IN T-COR

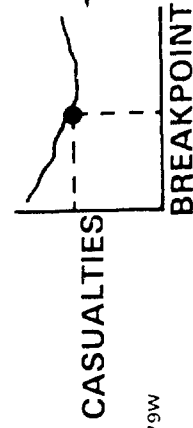
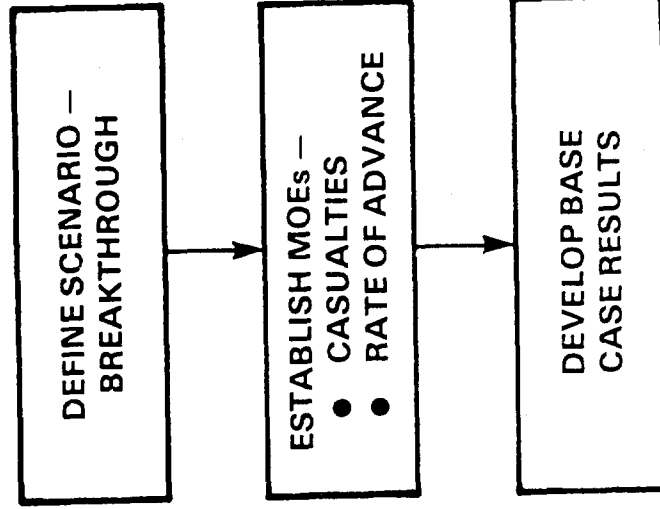
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

-
- **THE HUMAN PERFORMANCE PARAMETERS**
 - **BREAKPOINTS: THRESHOLDS OF ATTRITION**
 - **PERFORMANCE: RATES OF ADVANCE; RATES OF AMMO EXPENDITURE; C3 DELAYS...**
 - **METHODOLOGY**
 - **ESTABLISH BASE CASE SCENARIOS AND MOES**
 - **VARY HUMAN PERFORMANCE PARAMETERS BASED ON EXISTING AND EXTRAPOLATED DATA**
 - **SUMMARIZE AND ANALYZE MOE VARIATIONS**
 - **RESULTS**
 - **A QUANTITATIVE SUMMARY OF THE IMPACT OF VARIATIONS IN HUMAN PERFORMANCE ON KEY COMBAT MOES**

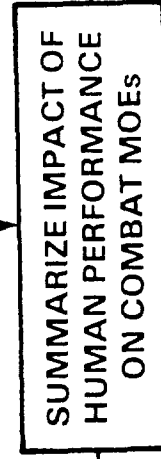
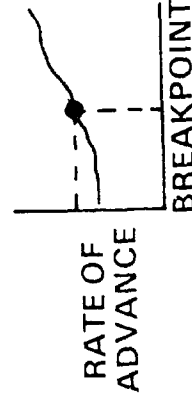
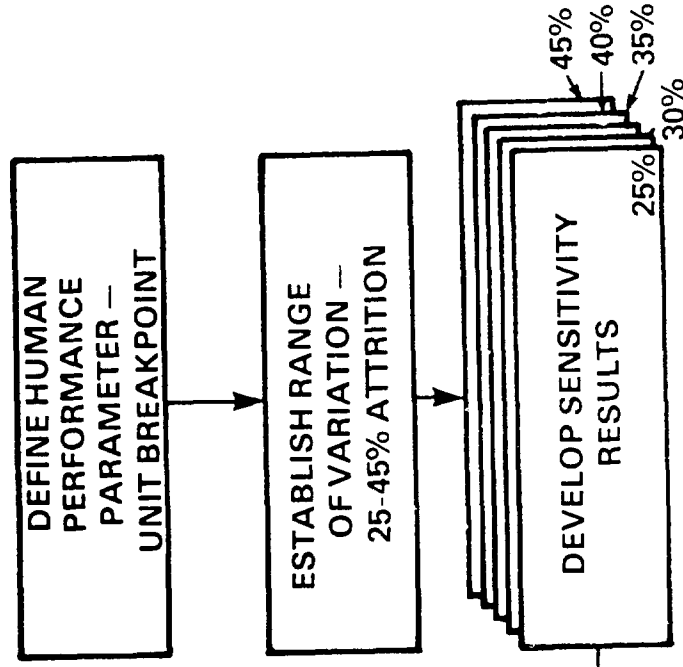
A SPECIFIC EXAMPLE: BREAKPOINT ANALYSIS

PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

TACTICAL CONTEXT



HUMAN PERFORMANCE



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**PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE**

UTILITY

- A FIRST STEP IN QUANTIFICATION
- AN IDENTIFICATION OF THE MAGNITUDE OF THE PROBLEM
- AN UNDERSTANDING OF AGGREGATE IMPACT, RATHER THAN INDIVIDUAL RESPONSE
- A FOCUSING ON AREAS FOR DETAILED INVESTIGATION

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PSYCHOLOGICAL RESPONSE

TO TACTICAL NUCLEAR WARFARE

SUMMARY

- PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE IS NOT WELL UNDERSTOOD, YET COULD BE SIGNIFICANT IN TERMS OF COMBAT EFFECTIVENESS
- PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE SHOULD BE INTERPRETED IN TERMS OF HUMAN PERFORMANCE
- IT IS GENERALLY BELIEVED THAT APPROPRIATE TRAINING WILL MINIMIZE POTENTIAL DEGRADATIONS IN PERFORMANCE
- EFFECTIVE INVESTIGATION OF THIS ISSUE REQUIRES A QUANTITATIVE APPROACH
- HUMAN PERFORMANCE MODELING IN COMBAT SIMULATION COULD PROVIDE A FIRST STEP IN REQUIRED QUANTIFICATION

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Anti-Submarine Warfare Sys. Proj. Office
Department of the Navy
ATTN: PM-4

Center for Naval Analysis
ATTN: NAVWAG

Charleston Naval Shipyard
ATTN: Commanding Officer

Marine Corps
Department of the Navy
ATTN: DCS (P&O) Strategic Plans Division
ATTN: Code OT00-31
ATTN: DCS (P&O) Requirements Division

David Taylor Naval Ship R&D Ctr.
ATTN: Code 174
ATTN: Code 1750, W. Conley
ATTN: Code 1750, J. Sykes
ATTN: Code L42-3

Naval Academy
ATTN: Nimitz Library/Technical Rpts. Branch

DEPARTMENT OF THE NAVY (Continued)

Marine Corps Dev. & Education Command
Department of the Navy
ATTN: Commander

Naval Air Development Center
ATTN: Code 702, B. McHugh

Naval Air Systems Command
ATTN: Code 350D, H. Benefiel

Naval Intelligence Command
ATTN: NIC-01

Naval Material Command
ATTN: MAT-00

Naval Ocean Surveillance Info. Ctr.
ATTN: P. Maier

Naval Ocean Systems Center
ATTN: J. Hooper
ATTN: G. Myer
ATTN: R. Hammond

Naval Postgraduate School
ATTN: Code 1424
ATTN: Code 56PR

Naval Research Laboratory
ATTN: Code 2627
ATTN: Code 8440, F. Rosenthal

Naval Sea Systems Command
ATTN: SEA-406
ATTN: SEA-06H2
ATTN: SEA-6431G, H. Seguire

Naval Submarine Base
ATTN: Commanding Officer

Naval Submarine School
ATTN: Commanding Officer

Naval Surface Force, Atlantic
ATTN: Commander

Naval Surface Force, Pacific
ATTN: Commander

Naval Surface Weapons Center
ATTN: Code U12
ATTN: Code F30
ATTN: Code F31
ATTN: Code U41
ATTN: Code R14

Naval Surface Weapons Center
ATTN: Code DG-50

Naval War College
ATTN: Code E-11

Naval Weapons Center
ATTN: Code 31707, L. Thompson

Naval Weapons Evaluation Facility
ATTN: G. Binns
ATTN: Technical Director

DEPARTMENT OF THE NAVY (Continued)

Navy Field Operational Intelligence Office
ATTN: Commanding Officer

Newport Laboratory
Naval Underwater Systems Center
ATTN: K. Walsh

Nuclear Weapons Tng. Group, Pacific
Department of the Navy
ATTN: Nuclear Warfare Department

Nuclear Weapons Tng Group, Atlantic
Department of the Navy
ATTN: Nuclear Warfare Department

Office of Naval Research
ATTN: Code 431
ATTN: Code 200

Office of the Chief of Naval Operations

ATTN: OP 985F
ATTN: OP 604E
ATTN: OP 03
ATTN: OP 981
ATTN: OP 021
ATTN: OP 09
ATTN: OP 00K
ATTN: OP 05
ATTN: OP 02
ATTN: OP 06
ATTN: OP 022
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Sixth Fleet
Department of the Navy
ATTN: Commander

Surface Warfare Development Group
Naval Amphibious Base
ATTN: Commander

Surface Warfare Officers School Command
Department of the Navy
ATTN: Combat Systems Dept.

Commander-in-Chief
U.S. Atlantic Fleet
Department of the Navy
ATTN: P.O. Box 100, Div. 20, Code 22
ATTN: Code J-5
ATTN: JCS
ATTN: CINC
ATTN: Code N-2
ATTN: Code N-3

U.S. Naval Air Forces, Pacific Fleet
ATTN: Commander

U.S. Naval Air Forces, Atlantic Fleet
ATTN: Commander

Commander-in-Chief
U.S. Naval Forces, Europe
ATTN: N326

U.S. Navy Second Fleet
ATTN: Commander

DEPARTMENT OF THE NAVY (Continued)

U.S. Navy Seventh Fleet
ATTN: Commander

U.S. Navy Third Fleet
ATTN: Commander

Commander-in-Chief
U.S. Pacific Fleet
ATTN: CINC
ATTN: Code N2

U.S. Submarine Force
Atlantic Fleet
ATTN: Commander

U.S. Submarine Force
Pacific Fleet
ATTN: Commander

DEPARTMENT OF THE AIR FORCE

Air Force School of Aerospace Medicine
ATTN: Radiobiology Division

Air Force Weapons Laboratory
Air Force Systems Command
ATTN: SUL
ATTN: NSSB

Assistant Chief of Staff, Intelligence
Department of the Air Force
ATTN: INE

Assistant Chief of Staff
Studies & Analyses
Department of the Air Force
ATTN: AF/SAGF
ATTN: AF/SAMI

Deputy Chief of Staff
Operations Plans and Readiness
Department of the Air Force
ATTN: AFXO0TR
ATTN: AFXOXFT
ATTN: Director of Plans
ATTN: AFXOXFM
ATTN: Director of Operations & Plans
ATTN: AFXOOR

Deputy Chief of Staff
Research, Development, & Acq.
Department of the Air Force
ATTN: AFRDQSM
ATTN: AFRDQR

Tactical Air Command
Department of the Air Force
ATTN: XP
ATTN: DRA
ATTN: DO
ATTN: INO
ATTN: XPB
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DEPARTMENT OF THE AIR FORCE (Continued)

U.S. Air Forces in Europe
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Los Alamos Scientific Laboratory
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ATTN: OSR/SE/F, A Rehm
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66th MI Group
ATTN: RDA, T. Greene

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ATTN: H. Blank

Decision-Science Applications, Inc.
ATTN: Dr. Galiano

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ATTN: DASIAC

General Electric Company—TEMPO
ATTN: DASIAC

Historical Evaluation & Rsch. Org.
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Hudson Institute, Inc.
ATTN: C. Gray
ATTN: H. Kahn

Institute for Defense Analyses
ATTN: M. Scher

JAYCOR
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Kaman Sciences Corp.
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ATTN: M. Cohen
ATTN: M. Beer

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ATTN: W. Schilling

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ATTN: W. McMillan

Mission Research Corp.
ATTN: D. Sowle

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ATTN: G. Lang

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ATTN: C. Whittenbury
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Science Applications, Inc.
ATTN: J. McGahan
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Science Applications, Inc.
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Systems Research & Application Corp.
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Systems, Science & Software, Inc.
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TRW Defense & Space Sys. Group
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